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10/563,926	01/09/2006	Paulus Wilhelmlus Gruijters	NL030817	3785

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

ip.department.us@nxp.com

Office Action Summary	Application No.	Applicant(s)	
	10/563,926	GRUIJTERS ET AL.	
	Examiner	**Art Unit**	
	EBONI GILES	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *29 April 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *09 January 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. This office action is in response to communication filed on 4/29/09. Claims 1-20 are pending in this application of which claims 14-20 are new.

2. Applicant's arguments with respect to claims 1, 10-13 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1, 10-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO 00/77961 to Kim in view of U.S. Patent 7,286,617 to Vanderperren et al ("Vanderperren").

Regarding Claim 1, Kim teaches "a receiver for receiving frequency signals comprising a processing stage for converting the frequency signals into baseband signals comprising preamble symbols and data symbols and for processing the baseband signals" where an apparatus for achieving frequency and symbol timing synchronization of OFDM signals…The apparatus receives an OFDM signal. The OFDM signal is made up of preamble data and payload data.

The preamble data includes an AGC symbol and a synchronizing symbol (pg. 6, lines 2-5).

Kim does not expressly disclose a first part for coarse time synchronization and a second part for fine time synchronization wherein the result of the coarse time synchronization performed by the first part is not used by the second part to perform the fine time synchronization.

Vanderperren discloses "a synchronization stage for synchronizing the processing stage comprising a first part for performing a coarse time synchronization through auto-correlating samples of a group of preamble symbols," where the rough symbol timing circuit (i.e. coarse time synchronization) determines symbol timing based on whether a known training sequence correlates with a received signal. The comparator compares the received signal with the amplitude signature of the auto-correlated training sequence and outputs a high logic signal to signify high correlation. The rough symbol timing determination circuit detects a peak and determines symbol timing (Col. 15, lines 27-55, Fig. 9b, elements 16, 30, 31, 35).

Vanderperren further discloses in another embodiment, "a second part for performing a fine time synchronization through cross-correlating samples of a further group of preamble symbols with predefined samples," where the accurate symbol timing circuit (i.e. fine time synchronization) determines symbol timing based on cross-correlation of a known training sequence. The comparator compares the received signal with the amplitude signature of the cross-correlated

training sequence and outputs a high logic signal to signify high correlation. The accurate symbol timing determination circuit detects a peak and determines symbol timing (Col. 15, line 56 - Col. 16, line 15, Fig. 9c, elements 19, 32, 41, 42).

Vanderperren further discloses "wherein the result of the coarse time synchronization performed by the first part is not used by the second part to perform the fine time synchronization," where a decision circuit is recited which compares the two outputs from the rough and accurate symbol timing determination circuits and makes a selection based on a threshold value. The decision to select either a rough symbol timing value or an accurate symbol timing value reads on the claimed results of the coarse synchronization is not used in fine synchronization since each value is generated and evaluated independently of one another.

The claim is constructed in a manner where the coarse and fine time synchronization is not linked together within the synchronization stage. The claim does not identify with what stage or device the processing stage is synchronized. Therefore, the claim is being interpreted in its broadest reasonable interpretation where two distinct circuits used to perform coarse and fine time synchronization, respectively, meets the limitations as described in the claim.

At the time of the invention, it would have been obvious to one of ordinary skill in the art to modify the receiver of Kim with the separate coarse and fine time synchronization circuits of Vanderperren. The suggestion/motivation would have

been in order to improve synchronization of a received signal (Col. 2, lines 39-40).

Claims 10 and 13 have limitations similar to those treated in the above rejection of Claim 1, and are met by the references as discussed above.

Process claim 11 is drawn to the apparatus corresponding to the method of using same as claimed in claim 1. Therefore, apparatus claim 1 corresponds to process claim 1 and is rejected for the same reasons of anticipation as used above.

Method claim 12 is drawn to the method of using the corresponding apparatus claimed in claim 1. Therefore, method claim 12 corresponds to apparatus claim 1 and is rejected for the same reasons of obviousness as used above.

Regarding Claim 14, Kim and Vanderperren disclose the limitations of Claim 1, upon which Claim 14 depends. Vanderperren further discloses "the further group of preamble symbols comprises a short preamble symbol and a long preamble symbol," where the cross-correlation pattern is based not only on the STS (short training sequence, i.e. short preamble) but also part of the LTS (long training sequence, i.e. long preamble) (Col. 14, lines 23-25).

At the time of the invention, it would have been obvious to one of ordinary skill in the art to modify the receiver of Kim with the further group of preamble symbols of Vanderperren. The suggestion/motivation would have been in order

to make it easier to detect peaks in a channel having many multipath components, delayed and attenuated copies of peaks (Col. 14, lines 19-21).

Regarding Claim 15, Kim and Vanderperren disclose the limitations of Claim 14, upon which Claim 15 depends. Vanderperren further discloses "wherein the long preamble symbol is a guard interval preamble symbol," where when cross-correlating the LTS, a first small peak is detected, due to the cyclic prefix (Col. 14, lines 36-41) where it is well-known in the art that a cyclic prefix is synonymous to a guard interval preamble symbol. In addition, the same motivation is used as in the rejection of Claim 14.

Regarding Claim 16, Kim and Vanderperren disclose the limitations of Claim 15, upon which Claim 16 depends. Vanderperren further discloses "wherein the second part comprises a crosscorrelator configured to use samples of the guard interval preamble symbol as the predefined samples and to crosscorrelate the predefined samples with the samples of the further group of preamble symbols," where the cross-correlation pattern is based not only on the STS but also part of the LTS which includes the cyclic prefix (i.e. guard interval) (Col. 14, lines 23-25).

At the time of the invention, it would have been obvious to one of ordinary skill in the art to modify the receiver of Kim with cross-correlation of Vanderperren. The suggestion/motivation would have been in order to create a stronger correlation amplitude peak at the position where the pattern fully matches the received samples (Col. 14, lines 26-28).

Regarding Claim 17, Kim and Vanderperren disclose the limitations of Claim 1, upon which Claim 17 depends. Vanderperren further discloses "wherein the first part is configured to perform the coarse time synchronization independently from the level of the baseband signals," where the top portions of the peaks and the bottom portions of the amplitude signal (i.e. baseband) may be distorted. Threshold values are used to make sure the significant peaks and troughs are detected in order to generate an expected curve whereby rough timing (i.e. coarse time synchronization) can be determined. The estimate of symbol timing is then extracted.

At the time of the invention, it would have been obvious to one of ordinary skill in the art to modify the receiver of Kim with coarse time synchronization of Vanderperren. The suggestion/motivation would have been in order to avoid spurious synchronizations (Col. 11, line 16).

6. Claims 2-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO 00/77961 to Kim in view of U.S. Patent 7,286,617 to Vanderperren et al ("Vanderperren") as applied to Claim 1 above and in further view of European Patent Application 1,071,251 to Mizoguchi et al. ("Mizoguchi").

Regarding Claim 2, Kim and Vanderperren disclose a receiver for receiving frequency signals comprising a processing and synchronization stage as recited in Claim 1.

Kim and Vanderperren do not expressly disclose a synchronization stage that comprises a third part for performing a coarse frequency synchronization

through detecting and accumulating phases of samples of a yet further group of preamble symbols.

Mizoguchi does expressly teach "a synchronization stage that comprises a third part for performing a coarse frequency synchronization through detecting and accumulating phases of samples of a yet further group of preamble symbols," where a frequency offset compensation circuit recognizes repetition signals in a received signal, or a preamble for synchronization, so that it measures carrier frequency offset between a transmit side and a receiver side by measuring a phase rotation between repetition waveforms, and compensates said carrier frequency offset (¶ 0011). Measuring the phase rotation detects and accumulates phases of each detected OFDM sub-carrier signal or sample. Mizoguchi further teaches that a preamble for synchronization comprises a plurality of repetitive known data patterns called a short interval (10 short intervals t1 through t10 provided) (¶ 0005, Fig. 11A);

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the receiver of Kim and Vanderperren with the coarse frequency synchronization part of Mizoguchi. The suggestion/motivation would have been in order to synchronize receiver carrier frequency with transmitter carrier frequency (Mizoguchi, ¶ 0006).

Regarding Claim 3, Kim, Vanderperren and Mizoguchi disclose a receiver for performing coarse frequency synchronization as recited in Claim 2.

Kim and Vanderperren do not expressly disclose a further group of preamble symbols is situated between the group of preamble symbols and the further group of preamble symbols.

Mizoguchi does expressly disclose "a further group of preamble symbols is situated between the group of preamble symbols and the further group of preamble symbols," where said frequency offset compensation means comprises means for compensating carrier frequency offset between a repetition period of a short preamble between a transmit side and a receiver side upon each receipt of said short preamble (¶ 0028). Mizoguchi further teaches that a preamble for synchronization comprises a plurality of repetitive known data patterns called a short interval (10 short intervals t1 through t10 provided) (¶ 0005, Fig. 11A) and that the OFDM packet communication receiver receives at least a preamble for synchronization having a plurality of repetitive know short preambles followed by at least one OFDM signal having a guard interval (¶ 0020).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the receiver of Kim and Vanderperren with a further group of preamble symbols of Mizoguchi. The suggestion/motivation would have been in order to accomplish independent synchronization of each received packet, including determination of reference timing of a received symbol (Mizoguchi, ¶ 0003).

7. Claims 4-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO 00/77961 to Kim in view of U.S. Patent 7,286,617 to Vanderperren et al

("Vanderperren") in view of European Patent Application 1,071,251 to Mizoguchi et al. ("Mizoguchi") as applied to Claims 2 and 3 above and in further view of U.S. Patent 6,754,170 to Ward.

As to Claim 4, Kim, Vanderperren and Mizoguchi disclose a receiver for performing coarse frequency synchronization comprising a further group of preamble symbols as recited in Claim 3.

Kim, Vanderperren and Mizoguchi do not expressly disclose that the third part is adapted to perform fine frequency synchronization.

Ward does expressly teach that "the third part is adapted to perform a fine frequency synchronization through detecting and accumulating phases of samples of another group of preamble symbols following the further group of preamble symbols," where the short symbols [i.e. preamble symbols t1-t10] are used to train the receiver's automatic gain control (AGC) and obtain a coarse estimate of the carrier frequency and the channel. The long symbols are used to fine-tune the frequency and channel estimates. Twelve subcarriers are used for the short symbols and fifty two subcarriers for the long symbols. The training of an OFDM receiver is typically accomplished over several of the short symbols and typically not less than the duration of two short symbols (Col. 8, lines 42-45) therefore the further group of preamble symbols which constitute training symbols are characterized with reference to this citation as long symbols. Fine frequency synchronization is accomplished in a similar manner as coarse frequency synchronization as described in the rejection of Claim 2 rather it relies

upon incrementally determining the carrier frequency offset over several sample periods.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the receiver of Kim, Mizoguchi and Vanderperren with a third part for performing fine frequency synchronization of Ward. The suggestion/motivation would have been in order to acquire the incoming signal and train and synchronize the receiver (Ward, Col. 8, lines 34-35).

As to Claim 5, Kim, Vanderperren and Mizoguchi disclose a receiver for performing coarse frequency synchronization as recited in Claim 2.

Kim, Vanderperren and Mizoguchi do not expressly disclose that the processing stage comprises a fourth part for performing an automatic gain control after the coarse time synchronization and before the coarse frequency synchronization.

Ward does expressly teach that "the processing stage comprises a fourth part for performing an automatic gain control after the coarse time synchronization and before the coarse frequency synchronization," where the short symbols [i.e. preamble symbols t1-t10] are used to train the receiver's automatic gain control (AGC) and obtain a coarse estimate of the carrier frequency and the channel (Col. 8, lines 42-43) and further discloses that during the first short symbol, automatic gain control is performed by the AGC (Col. 11, lines 38-39, Fig. 4). The coarse time synchronization as stated in the disclosure is performed within the first group of short symbols, t1-t3, therefore the AGC

processes the signal based on that first group to result in a coarse frequency estimate. The coarse frequency is further processed and synchronized during the next group of short symbols, t4-t7.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the receiver of Kim, Mizoguchi and Vanderperren with a fourth part for performing an automatic gain control of Ward. The suggestion/motivation would have been in order to perform synchronization functions within the period of a few short symbols, especially in the event of bad channel selection (Ward, Col. 4, lines 38-41).

8. Claims 6 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO 00/77961 to Kim in view of U.S. Patent 7,286,617 to Vanderperren et al ("Vanderperren") as applied to Claim 1 above and in further view of U.S. Patent 6,754,170 to Ward.

Regarding Claim 6, Kim and Vanderperren disclose a receiver for receiving frequency signals comprising a processing and synchronization stage as recited in Claim 1.

Kim and Vanderperren do not expressly disclose a processing stage comprising a mixing unit, transformating unit, buffering unit and controlling unit.

Ward does expressly disclose "a mixing unit for converting the frequency signals into the baseband signals," where an incoming OFDM signal is input to an analog-to-digital converter (A/D)...The sampled signal...is also applied to an I/Q sequencer for non-coherently converting the real intermediate A/D frequency

samples into I and Q signals having baseband and other frequency components. (Col. 9, lines 56-66, Fig. 4, elements 201, 202, 202') which reads on the mixing unit as stated in the disclosure since it comprises an ADC and an I/Q sequencer which is analogous to a digital mixer for converting the signals to baseband;

Ward further discloses "a transformating unit coupled to an output of the mixing unit for processing the baseband signals," where the I and Q signals are passed through low pass filters (LPF) for removing unwanted frequencies and forming a continuous baseband output signal of baseband I/Q channels at a 20 MHz rate...a fast Fourier transform (FFT) circuit which performs a fast Fourier transform on the incoming signal at 16 or 64 complex point processing at a burst processing rate of 40 MHz (Col. 9, lines 64-67 & Col. 10, lines 12-14, Fig. 4, elements 203, 204, 211) which reads on the transformating unit as stated in the disclosure since it comprises an FFT and a LPF which performs an equalization function for processing baseband signals;

Ward further discloses "a synchronization stage comprising a buffering unit coupled to the output of the mixing unit for buffering at least a part of the baseband signals," where a buffering circuit holds the short, medium and long symbols of the preamble of the OFDM received signal (Col. 10, lines 3-5, Fig. 4, element 206) where the converted signal output from the mixing unit comprises symbols which are a baseband version of the OFDM received signal;

Ward further discloses "a controlling unit coupled to control inputs of the mixing unit and the transformating unit for controlling the mixing unit and the

transformating unit," where the sampled signal is applied to an automatic gain controller (AGC) 202 which supplies iterative feedback to an RF circuit for gain control, and is also applied to an I/Q sequencer 202' for non-coherently converting the real intermediate A/D frequency samples into I and Q signals having baseband and other frequency components (Col. 9, lines 58-64, Fig. 4, element 202) where the AGC (automatic gain control) circuit controls the amplitude of the OFDM signal that will be supplied to the mixing unit (i.e. ADC) and transformating unit (i.e. FFT and LPF);

Ward further discloses that the "inputs of the first part and the second part being coupled to an output of the buffering unit and with an output of the first part being coupled to a first input of the controlling unit and with an output of the second part being coupled to a second input of the controlling unit," where another output of the constellation processing circuit is applied to a timing synchronizer circuit in accordance with this invention which acquires the OFDM boundaries of the short and long symbols and provides a fractional bin timing pulse (Col. 10, lines 24-28, Fig. 4, elements 213, 214, 216) reading on the claimed second part (i.e. cross-correlation unit) for fine time synchronization, as disclosed by Kim in the rejection of Claim 1, since the fractional part of the timing pulse represents fine tuning of the signal. Ward further discloses that the timing synchronizer of this invention has another output connected to the buffer for adjusting the timing prior to reaching the FFT circuit. This is an integer sample timing correction (Col. 10, lines 40-43, Fig. 4, elements 206, 211, 216) reading on

the claimed first part (i.e. auto-correlation unit) for coarse time synchronization, as disclosed by Kim in the rejection of Claim 1, since the integer part represents whole sample offsets. The buffering unit stores the preamble signals necessary to perform fine and coarse timing synchronization.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the receiver of Kim and Vanderperren with a processing stage of Ward. The suggestion/motivation would have been in order to acquire the incoming signal and train and synchronize the receiver (Ward, Col. 8, lines 34-35).

As to Claim 9, Kim, Vanderperren and Ward disclose a receiver for receiving frequency signals comprising a processing and synchronization stage as recited in Claim 6.

Kim teaches a second part for performing fine time synchronization, where the reference signal generator generates and outputs a reference signal, and the complex conjugator complex-conjugates the reference signal. The multiplier multiplies the complex-conjugated reference signal by the frequency offset-compensated signal output from the frequency compensator, and the moving average calculator calculates a moving average. That is, a cross correlated value is obtained by cross correlation performed by the multiplier and the moving average calculator. The normalizer normalizes the cross correlated value output from the moving average calculator. The cross correlation unit performs cross correlation using the frequency offset-compensated signal and the reference

signal and normalizes a cross correlated value, thereby outputting a normalized cross correlated value. The symbol timing synchronization unit detects a point where the cross correlated value is maximum...where an error of about ± 16 samples is allowed (pg. 8, lines 1-21). The complex conjugator essentially performs the function of the claimed absolute value unit. The moving average calculator is analogous to the integrator as it determines a moving average of the frequency offset-compensated signal. The cross correlation uses values output from the moving average calculator. The normalizer is analogous to the scaling unit which receives values from the moving average calculator. The symbol synchronization unit comprises a deciding unit which detects the peaks of the cross correlation values.

As to Claim 20, Kim and Ward disclose a receiver comprising a cross-correlation unit as recited in Claim 9.

Kim further discloses "wherein the integrating unit comprises a sliding window integrator configured to generate an average value of the samples of the further group of preamble symbols and the scaling unit comprises a multiplier configured to multiply the average value of the samples of the further group of preamble symbols with a multiplication factor to generate a threshold value for the deciding unit," where the cross-correlated value is obtained by cross correlation performed by the multiplier and the moving average calculator (i.e. sliding window integrator). The normalizer (i.e. scaling unit) normalizes the cross correlated value output from the moving average calculator… The symbol timing

synchronization unit detects a point where the cross correlated value is maximum (pg. 8, lines 5-16). The symbol timing synchronization unit makes a decision as to the maximum peak of the cross-correlation thereby achieving a threshold value.

9. Claims 7-8 are rejected under 35 U.S.C. 103(a) as being unpatentable WO 00/77961 to Kim in view of U.S. Patent 7,286,617 to Vanderperren et al ("Vanderperren") in view of U.S. Patent 6,754,170 to Ward as applied to Claim 6 above and in further view of European Patent Application 1,071,251 to Mizoguchi.

Regarding Claim 7, Kim, Vanderperren and Ward disclose a receiver for receiving frequency signals comprising a processing and synchronization stage as recited in Claim 6.

Kim does expressly teach that the auto-correlation unit receives data including a synchronizing symbol made up of at least three identical synchronizing signals, delays the received data by a pre-determined delay amount, performs auto-correlation between the received data and the delayed data, normalizes an auto-correlated value. The peak flat detector detects as a flat section a section where the normalized auto-correlated value is equal to or greater than the threshold value (pg. 3, lines 6-14). The peak flat detector of the cited art is analogous to the integrating unit for performing envelope detection as stated in the disclosure. The normalization of the auto-correlated value is performed by multiplying the envelope by a multiplication factor and is analogous to the scaling function performed as stated in the disclosure. The auto-

correlation between the received data and the delayed data reads on the deciding unit for comparing the envelope [flat detection] with the delayed and upscaled version of itself as stated in the disclosure. The auto-correlator provides the data for the coarse time synchronization, i.e. first part. The received data is delayed prior to auto-correlation, once auto-correlation is performed a normalized or scaled value is produced. The peak flat detector, i.e. integrating unit contains a deciding unit used to determine whether the normalized value meets a threshold. It would be an obvious variation to integrate the values from the auto-correlator prior to delaying the received signal and scaling the auto-correlated value. The integrator serves to perform envelope detection to smooth the signal after coarse time synchronization has been performed.

Kim, Vanderperren and Ward do not expressly teach a second delaying unit or logical units.

Mizoguchi does expressly teach that a correlation output filter is applied to a threshold circuit through a delay circuit and an output of the delay circuit is further applied to another threshold circuit through another delay circuit (Col. 10, lines 34-37) reading on the claimed second delaying unit for delaying comparator signals (i.e. threshold circuit) as stated in the disclosure. Mizoguchi further teaches that the output of the threshold circuits are applied to a logic circuit which is implemented by an AND circuit (Col. 10, lines 57-58) reading on the claimed logical units for combining the comparator signals as stated in the disclosure. It would be an obvious variation to delay the auto-correlated value from the

deciding unit taught by Kim since delaying the value would possibly eliminate a phase difference and thereby reduce coarse frequency error.

It would have been obvious at the time of invention to combine a second delaying unit and logical unit taught by Mizoguchi with a first part taught by Kim. The suggestion/motivation would have been in order to compensate carrier frequency offset in a receiver (Mizoguchi, ¶0016).

As to Claim 8, Kim, Vanderperren, Mizoguchi and Ward disclose a receiver for receiving frequency signals comprising a first part for coarse time synchronization as recited in Claim 7.

Kim, Vanderperren and Ward do not expressly disclose a third part for performing coarse and fine frequency synchronization comprising a phase detector and accumulator.

Ward does disclose that a time delay is derived at the output of the FFT circuit when multiplied by the complex exponential. The time delayed signal represented by the short symbols in the OFDM preamble can be used to estimate the time delay as a common phase rotation. This time estimate represents both the integer sample timing correction and the fractional sample timing correction (Col. 10, lines 63-67 & Col. 11, lines 1-2). The output of the FFT, a part within the auto-correlator, is representative of the first part of the receiver and the time estimate derives the coarse (i.e. integer sample timing) and fine frequency (i.e. fractional sample timing) synchronization.

Mizoguchi does expressly teach that an output of the hold circuit is applied to the phase compensation calculate circuit. An input to the phase compensation calculate circuit is phase rotation during repetition period of a short preamble caused by carrier frequency offset. By using the input signal, the phase compensation calculate circuit calculates the phase rotation for every sample of the OFDM signal, and generates opposite phase rotation through integration process for compensating the phase rotation of a received signal caused by carrier frequency offset. An output of the phase compensation calculate circuit is applied to the compensation circuit, which compensates phase rotation of a received signal according to an output of the phase compensation calculate circuit, and provides a compensated signal which is free from the carrier frequency offset (¶ 0075-0076). The phase compensation calculate circuit is analogous to the claimed phase detecting circuit and the compensation circuit is analogous to the claimed phase accumulating circuit. The phase compensation calculate circuit is coupled to the buffer which is part of the auto-correlating circuit as stated in the disclosure. The compensated signal from the compensation circuit is provided to the controlling unit in order to eliminate the carrier frequency offset. In addition, the same motivation is used as in the rejection of Claim 7.

Regarding Claim 18, Kim, Vanderperren, Mizoguchi and Ward disclose a receiver for receiving frequency signals comprising a first part for coarse time synchronization as recited in Claim 7.

Kim further discloses “wherein the integrating unit comprises an integrator configured to perform envelope detection on the result of the autocorrelating unit,” where the peak flat detector detects as a flat section a section where the normalized auto-correlated value is equal to or greater than the threshold value (pg. 3, lines 12-14). The peak flat detector of the cited art is analogous to the integrating unit for performing envelope detection as stated in the disclosure.

Regarding Claim 19, Kim, Vanderperren, Mizoguchi and Ward discloses a receiver comprising an integrating unit as recited in Claim 18.

Kim further discloses “wherein the first delaying unit comprises a first delay line configured to delay the envelope of the envelope detection to generate a delayed envelope, the scaling unit comprises a multiplier configured to multiply the delayed envelope with a multiplication factor to generate a multiplied and delayed envelope, and the deciding unit comprises a comparator configured to compare the envelope of the envelope detection with the multiplied and delayed envelope,” where the auto-correlation unit receives data including a synchronizing symbol made up of at least three identical synchronizing signals, delays the received data by a pre-determined delay amount, performs auto-correlation between the received data and the delayed data, normalizes an auto-correlated value. The peak flat detector detects as a flat section a section where the normalized auto-correlated value is equal to or greater than the threshold value (pg. 3, lines 6-14). The peak flat detector of the cited art is analogous to the integrating unit for performing envelope detection as stated in the disclosure.

The normalization of the auto-correlated value is analogous to the scaling function performed as stated in the disclosure. The auto-correlation between the received data and the delayed data reads on the deciding unit for comparing the envelope [flat detection] with the delayed and up-scaled version of itself as stated in the disclosure.

Conclusion

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL.** See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to EBONI GILES whose telephone number is (571)270-7453. The examiner can normally be reached on 7:30 AM - 5 PM, M-F, alternate Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mohammad Ghayour can be reached on (571) 272-3021. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only.

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